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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference TIMK 8429WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US 03/22135	International filing date (day/month/year) 16.07.2003	Priority date (day/month/year) 17.07.2002
International Patent Classification (IPC) or both national classification and IPC G01P1/00		
Applicant THE TIMKEN COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet. <input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of 3 sheets.
3. This report contains indications relating to the following items: I <input checked="" type="checkbox"/> Basis of the opinion II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 10.02.2004	Date of completion of this report 09.11.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Pflugfelder, G Telephone No. +31 70 340-2890



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I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-9 as originally filed

Claims, Numbers

1-13 received on 30.09.2004 with letter of 30.09.2004

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

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5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-13
	No: Claims	
Inventive step (IS)	Yes: Claims	1-13
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations

see separate sheet

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Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: EP0694765 (MAGNETI MARELLI FRANCE) 31 January 1996 (1996-01-31)
D2: DE 100 34 844 A (DELPHI TECH INC) 12 April 2001 (2001-04-12)

The document D1 was not cited in the international search report. A copy of the document is appended hereto.

1. Novelty / Inventive step

The present application meets the criteria of novelty and inventive step Article 33(1),(2),(3) PCT.

1.1 The document D1 discloses (see figure 5; column 8, lines 2-4) (the references in parentheses applying to this document):

- a rotation sensor producing a signal reflecting the angular velocity of an adjacent rotating target;
- said sensor having a housing with a slot for receiving a mounting screw;
- the slot ("oeillet (732)") being formed from a deformable material ("bride (730) est venue de moulage... de matière thermoplastique").

D1 does not disclose the features of claim 1, that the slot is containing a

- permanent indentation receiving a portion of (the mounting) screw, said indentation being formed by the screw itself and being of a configuration that **prevents displacement of said slot along said screw** when said portion of the screw is in the indentation and,
- when the sensor is to be reinstalled in the same position, said portion of said screw is again **received** in said indentation.

The claim is thus novel.

The problem to be solved by the differing features can be seen as to provide a mounting structure allowing precise and easy reinstallation of the sensor after a

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maintenance procedure.

The sensor of D1 being made of a soft material (e.g. a moulded polymer) may also be submitted to a similar technical effect, of creation of an indentation in its soft slot rim by the head of a mounting screw during the operations of its normal use (installation / dismounting / reinstallation). Such an effect would be immediately visible and could be used as a reference mark of the former installation position when the sensor would needed to be positioned at its old location. The mounting screw could then be introduced the at this very position of the indentation of the rim of the slot of the retainer ear.

The indentation in the slotted rim of D1 however would only be shallow, so that it would not provide the capability as an aid for (temporarily) holding the housing slot in a fixed position with regard to the screw as long as the screw is not completely turned down. The indentation and would therefore not have the same guiding function during mounting. Precise alignment of screw and eventual indentation of D1 would need additional care during mounting.

Particular structures in the slot for **receiving** a portion of the screw (such as the deformable slot rim (46) or the tapered side walls (62) of the slot (see figures 8,12 of the present application)) are not mentioned in D1.

Modification of the apparatus of D1 in order to come to the apparatus of claim 1 is therefore not considered to be obvious for the skilled person and the claim is considered to be inventive.

D2 (see column 5, line 29 - column 7, line 6: column 9, lines 5-30; figures) also does not show the above differing feature of the permanent deformation (of the rim of the slot) and needs serrated washers as additional structural elements in order to achieve the desired functions. Claim 1 is therefore also novel and inventive over D2.

1.2 Independent method claim 8 refers to a installation method for the sensor of claim 1 and provides the method features corresponding to the apparatus features of claim 1. The claim is therefore also novel and inventive.

1.3 Claims 2-7 as depending on novel and inventive apparatus claim 1 and claims 9-13 depending on novel and inventive method claim 8 are also novel and inventive.

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2. Industrial Applicability

The claimed invention meets the requirement of Article 33(4) PCT of industrial applicability.

3. Further remarks

- 3.1 The independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would have been appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 3.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- 3.3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1,D2 is not mentioned in the description, nor are these documents identified therein.

Claims

1. A sensor for monitoring the angular velocity of a rotating device that carries a target, said sensor comprising:
 - 5 a housing having at least one slot and, along the slot, being formed from a material that is capable of being deformed by a screw inserted into the slot, such that the screw will impart a permanent indentation to the housing along the slot;
 - 10 and a sensing element located in the housing and being capable of producing a signal in response to a target rotating adjacent to it, with the signal reflecting the angular velocity of the target.
2. A sensor according to claim 1 wherein the housing has a front face; wherein the slot opens out of the front face; and wherein the deformable material forms a rim along the slot, with the rim projecting beyond the front face.
- 15 3. A sensor according to claim 2 wherein the rim has an indentation that is capable of receiving the head of a screw.
4. A sensor according to claim 2 in combination with a screw extended through the slot and having a head which lies over the rim.
5. The combination according to claim 4 wherein the rim contains an indentation and the screw has a head which is received in the indentation.
- 20 6. A sensor according to claim 1 wherein the housing has a front face and a back face; wherein the slot opens out of both faces and has side walls which taper downwardly toward the back face so that the slot is wider at the front face than it is at the back face; and wherein the deformable material is located along the side walls of the slot.
- 25 7. A sensor according to claim 6 wherein the housing has indentations which open out of the tapered side walls of the slot and are configured to receive the shank of a screw.
- 30 8. A sensor according to claim 7 in combination with a screw having a shank and a head from which the shank extends, the shank extending

through the slot where it is received in the indentations and the head overlying the front face of the housing.

9. A sensor according to claim 1 wherein the housing within its deformable material at the slot contains an indentation suitable for 5 receiving a screw.

10. A sensor according to claim 9 in combination with a screw in the indentation.

11. The combination according to claim 10 and further comprising a case having a mounting surface and a hole which opens out of the 10 mounting surface, and a target which rotates adjacent to the mounting surface; wherein the housing of the sensor is against the mounting surface and is oriented such that the sensing element is presented toward the target; and wherein the screw extends into the hole in the case.

15 12. In combination with a case that has a mounting surface out of which at least one hole opens, and with a shaft that carries a target which rotates adjacent to the mounting surface, and with a screw which extends into the hole, a speed sensor for producing a signal which reflects the angular velocity of the shaft, said speed sensor comprising:

20 a housing having a back face that is presented toward the mounting surface on the case and a front face that is presented away from the mounting surface and at least one slot that extends generally toward and away from the shaft and is aligned with the hole, the screw being extended through the slot and into the hole to secure the housing 25 to the case, the housing along the slot being formed from a deformable material and containing an indentation which receives the screw such that the position of the screw along the slot is fixed; and

a sensing element in the housing and having a sensing face that is presented toward the target.

30 13. The combination according to claim 12 wherein the housing of the sensor has a rim located along the slot and projected beyond the front face, and the indentation is in the rim.

14. The combination according to claim 12 wherein the slot has side walls that extend between the front and back faces of the housing, and the indentations are located along the side walls.

15. The combination according to claim 14 wherein the side walls of the slot tapered downwardly toward the back face and the indentations are at the back face, but not at the front face, whereby the slot is wide enough to receive the shank of the screw at the front face.

16. The combination according to claim 12 wherein the slot is one of two slots in the housing and the slots are parallel; wherein the screw is one of two screws; and wherein the hole is one of two holes, each of which is threaded.

17. The combination according to claim 12 wherein the housing includes a sacrificial rim which projects beyond the sensing face a prescribed distance and is along the target to establish a known air gap between the target and sensing face.

18. A process for installing the speed sensor of claim 1 against a mounting surface that is located on a case at a substantial angle with respect to a rotating shaft that carries a target, with the case being provided with a threaded hole that opens out of the mounting surface, said process comprising:

19. placing the housing against the mounting surface with the slot aligned with the hole in the housing and with the sensing element being presented toward the target on the shaft at a prescribed distance from the target;

20. placing a screw in the slot and aligning it with the hole; and with the screw creating an indentation in the housing, which indentation receives the screw such that the screw positively fixes the position of the housing on the case and prevents the housing from being displaced with respect to the target.

21. 19. The process according to claim 18 wherein the screw has a head, and the head creates the indentation.

20. The process according to claim 19 wherein the screw has a shank, and the shank creates indentations in the side wall of the slot.
21. A process according to claim 18 wherein placing the housing against the mounting surface with the sensing element being presented toward the target at a prescribed distance from the target includes, placing a sacrificial rim on the housing against the target, and the indentation is created with the sacrificial rim against the target.
- 5 22. A process for removing and reinstalling the sensor set forth in claim 11, said process comprising:
 - 10 removing the screw from the hole;
 - withdrawing the sensor from the mounting surface;
 - thereafter placing the housing of the sensor against the mounting surface with the slot aligned with the hole; and
 - inserting the screw into the hole in the case such that the screw is
 - 15 received in the indentation in the housing; whereby the sensor assumes essentially its former position on the case.